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and other scientific societies. Such a directory is a necessary preliminary of the activities of the committee on international cooperation in intellectual work.

#### CALENDAR REFORM

REFORM of the calendar has been much discussed during the past decade or more, for the inconveniences and inconsistencies of the present calendar are obvious.

The two schemes which are receiving the largest amount of attention are the international fixed calendar plan and the Swiss plan.

The former, first publicly proposed by Moses B. Cotsworth of Vancouver in 1894, provides for thirteen months in the year, with twenty-eight days to the month, every date being attached to the same day of the week in every month. New Year's Day is a zero day called January 0, and is a full holiday. The extra day in leap year is a similar holiday inserted as July 0. The extra month, which, of course, does not add to the actual length of the year, is introduced between June and July, and is called "Sol." Easter is to be fixed by the Christian churches on some date between March 21 and April 26, this stabilizing an event whose drifting causes inconveniences and losses in business and social life.

The Swiss plan has been advocated largely by astronomers. It also sets aside each New Year's Day and each leap-year day as independent legal holidays. The other 364 days are divided into four quarters of 91 days each, each quarter containing one month of 31 days and two months of 30 days, thus keeping twelve months as at present.

The international fixed calendar plan recently received the unanimous approval of a convention held in Washington by those interested in calendar reform. The American section of the International Astronomical Union, after considering both the

Swiss plan advocated by its committee on calendar reform and the fixed calendar plan, recently refused to take action on the matter.

The question of calendar reform was taken up at a meeting of the International Association of Academies held in St. Petersburg in 1913, and a committee was appointed on that occasion "to study questions relative to the unification and simplification of the calendars and the fixing of the date of Easter." This committee would have made a report in 1916, but for the war. Another discussion of this subject took place at the International Geographical Congress held in Rome in 1913. In June of the same year the World Congress on International Associations, which met at Brussels, passed a resolution urging the governments of the world to adopt a universal calendar. Three of the International Congresses of Chambers of Commerce have given expression to the same desire. Finally, just before the outbreak of the world war, the International Congress on the Reform of the Calendar held its sessions at Liège, and not only agreed to urge the adoption of a universal and improved calendar but also made plans for a formal conference, which was to have been convoked in Switzerland at the invitation of the Swiss government but was never held.

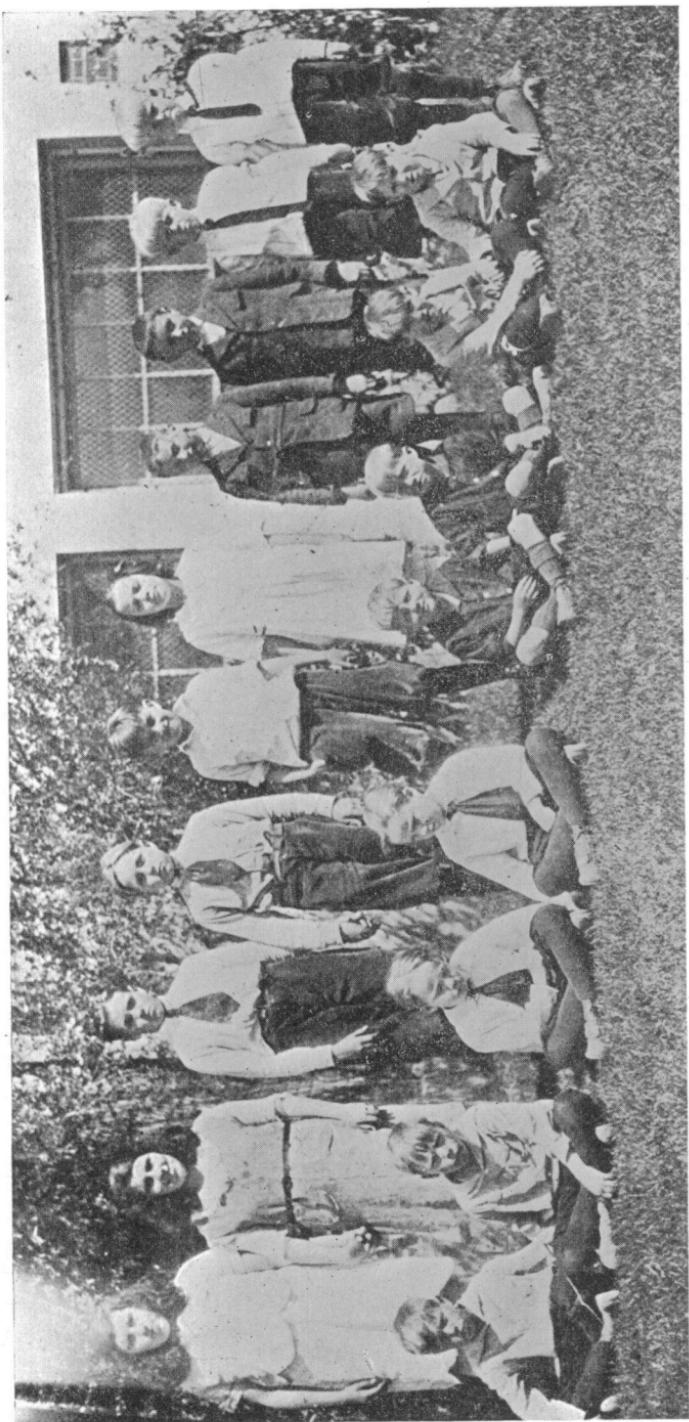
In the future there may come a conference of nations that will adopt a new and more logical calendar as easily as standard time was established by an international conference at Washington about forty years ago.

#### INVISIBLE SUN-SPOTS

DR. GEORGE ELLERY HALE, director of the Mount Wilson Observatory, has announced the discovery of invisible sun-spots. In 1908 Dr. Hale found that a sun-spot is a great whirling storm, similar to a terrestrial tornado, but on a gigantic scale, often vastly larger than the earth. The ex-

Wide World Photos.

TWINS ATTENDING A LOS ANGELES PUBLIC SCHOOL



pansion of the hot solar gases, caused by the centrifugal action of the whirl, cools them sufficiently to produce the appearance of a dark cloud, which we call a sun-spot. If this cooling is not great enough to produce a visible darkening of the surface, the whirling storm may still be present, though invisible to the eye. Such invisible whirls have now been detected by their magnetic effect on the light emitted by the luminous vapors within them.

Magnetic fields in visible sun-spots were first found by Dr. Hale in 1908. They are due to the whirl of electrified particles in the spot vortex, just as the magnetic field of an electromagnet is produced by the whirl of electrons through its wire coils. The magnetic field in a sun-spot is recognized by the effect it produces on the lines in the spectrum. A line due to iron vapor, for example, is split into three parts by the powerful magnetic field in a large spot. In a very small spot, where the magnetic field is much weaker, the line is not split up but is merely widened.

Invisible spots were discovered by exploring promising regions of the sun where signs of disturbance, such as faculae or clouds of calcium vapor, are present. A special polarizing apparatus moves back and forth across the slit, while the iron line is watched through a very powerful spectroscope. The presence of a weak magnetic field, showing the existence of an invisible spot, is betrayed by a slight oscillation of the corresponding part of the line, caused by its widening successively to right and left as the polarizing apparatus oscillates over the slit.

Ten invisible spots have been found since November by this method by Messrs. Hale, Ellerman and Nicholson with the 150-foot tower telescope and 75-foot spectroscope on Mount Wilson. Some of them foreshadow the birth of a visible spot, which finally appears to the eye several days after

the first indications of the whirl have been found. Others correspond to the period of decay, and permit a spot to be traced for some time after it ceases to be visible. In other cases the invisible spot never reaches maturity, which means that the cooling produced by expansion never becomes great enough to produce perceptible darkening of the sun's disk.

#### TWINS AGAIN

THE popular interest in twins seems to have considerable vitality. Every year brings into the public press and magazines some news item or article concerning multiple births. Just a year ago the whole country was stirred by the announcement of the birth of quadruplets in New Haven, Connecticut. (By the way, they have all passed their first birthday). Recently the newspapers carried full accounts of the death of the conjoined Blazek twins of Chicago, recalling the older days when the Siamese twins were in the prints and broadsides. Now comes Los Angeles, with photographic evidence that in one school building are enrolled as many as nine pairs of twins. And on the heels of the City of Angels comes the City of Churches, Brooklyn, with a contingent of ten pairs of twins, all attending Public School 77. Some statistician may soon find for us a rural school in which 30 per cent. or more of the entire enrollment are twins.

After all, twins are more common than we ordinarily suppose; and our interest in them far exceeds their rarity. Wappeus found that more than one child was born in 1.17 per cent. of 20,000,000 cases of labor. Pre-war Prussian statistics showed that twins occurred once in 89, triplets once in 7,910, and quadruplets once in 371,125 labors. This does not, of course, mean that all survive. The hazards of birth and of both prenatal and neonatal life are greater for plural than for singular pregnancies.